

## SUBJECT TEACHING GUIDE

M541 - Soils: Physical, Chemical and Biological Phenomena

Master's Degree in Environmental Engineering

Academic year 2017-2018

1. IDENTIFYING DATA					
Degree	Master's Degree in Environmental Engineering		Type and Year	Optional. Year 1	
Faculty	School of civil Engineering				
Discipline	Levelling Subjects: Soils and Waste				
Course unit title and code	M541 - Soils: Physical, Chemical and Biological Phenomena				
Number of ECTS credits allocated	4,5	Term	Semester based		
Web	<a href="http://personales.unican.es/estebana/suelosFFQB/">http://personales.unican.es/estebana/suelosFFQB/</a>				
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. CIENCIAS Y TECNICAS DEL AGUA Y DEL MEDIO AMBIENTE			
Name of lecturer	ANA LORENA ESTEBAN GARCIA			
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Other lecturers				

### 3.1 LEARNING OUTCOMES

- Knowledge: Describing the importance of the medium "soil" from the ecological and socio-economic standpoint.
- Knowledge: Describe the major physical, chemical and biological properties of soils and methods for their calculation and measurement.
- Knowledge: Describe the major systems and criteria for the classification of soils.
- Knowledge: Describe the different types of physical, chemical and biological degradation in soils, its causes and effects.
- Knowledge: Explaining the degradation by erosion: the extent of the problem, processes and mechanisms that cause it and influencing factors
- Knowledge: Explaining the tools for evaluation and control of erosion: measurement, risk assessment, modeling and control strategies.
- Knowledge: Explaining the degradation by pollution: causes, consequences and phenomena of the contaminants in the soil.
- Knowledge: Explaining the tools for contaminated land management: legislation, research, risk assessment, methods of remediation.
- Ability: To quantify the various properties of soils using parameters.
- Skill: Explain how to perform a sieve analysis and obtain the granulometric curve and texture of a soil.
- Skill: Explain and manage the parameters that characterize the structure and relationships between the phases of a soil.
- Skill: Getting the parameters characterizing the structure of soil from the test data, relate them and calculate one from each other.
- Skill: Apply basic knowledge of soil mechanics: simple stress states obtaining, basic assessment of their strength and mechanical stability.
- Skills: Get a soil chemical parameters from the results of chemical analysis.
- Skills: Being able to classify a soil from its properties by a simple classification system (System USCS).
- Skill: Inferring the behavior of a soil or its response against external shocks (erosive agents, increase of pollution, etc..) from the knowledge of their properties.
- Skill: Apply Universal Soil Loss Equation at a basic level
- Skill: Calculate the distribution of a contaminant in the various phases of soil from knowledge of the properties of the pollutant and soil.
- Skill: Evaluate, with simple mathematical tools (analytical equations) and in homogeneous soils, the transport of contaminants in the vadose zone and in the saturated zone of soil based on the properties of the pollutant and soil.
- Skills: Management in the laboratory to obtain some basic properties of soils.
- Skills: Find, collect, organize, analyze and display information on a topic related to the course content.
- Attitude: Become aware of the problems of soil degradation.
- Attitude: Taking a global view of environmental problems and in particular the interrelationships between land degradation and waste management, water degradation (both their quality and availability), air pollution and climate change .
- Attitude: teamwork
- Attitude: to be critical to sources of information

### 4. OBJECTIVES

- Know, understand and know how to apply the basic concepts of physical, chemical and biological processes that take place in the soil.
- Knowing and understanding the concept and types of physical, chemical and biological degradation in soil.
- Know, understand and know how to apply (at a basic level) the engineering tools available for study, prevention, conservation and recovery of degraded soils in their physical, chemical and biological properties.

6. COURSE ORGANIZATION	
CONTENTS	
1	SECTION I: Properties and physical, chemical and biological phenomena of soils.
1.1	Teaching Unit I: Introduction and physical properties
1.2	Teaching Unit II: Physico-chemical and biological properties. Soil types.
2	SECTION II: Phenomena of degradation of the physical, chemical and biological soil quality.
2.1	Teaching Unit III: Types of degradation. Erosion.
2.2	Teaching Unit IV: Soil contamination.

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Individual Works	Work	No	Yes	40,00
Teamwork.	Work	No	No	20,00
Final evaluation	Written exam	Yes	Yes	40,00
TOTAL				100,00
Observations				
To pass the course the student must attend a session of laboratory practices and submit a report thereon . Class attendance and participation, the quality of the laboratory report, etc. may be considered in the marks by adding up to 0.5 points.				
Observations for part-time students				
If a student has applied for and obtained his master's degree in enrollment in part-time, the student can access the single evaluation mode. The single assessment shall be a final evaluation (written exam) that will score 50% of the grade and the delivery of individual works (without requiring oral) with a weight of 50%. They must also attend the Laboratory session and submit a report thereon. Like the full-time students, they will have access to all the course documentation through a virtual teaching platform.				

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
PORTA, J., LÓPEZ-ACEVEDO, M., ROQUERO, C. (2003) Edafología para la agricultura y el medio ambiente. Ed. Mundi-Prensa. 3ª edición. ISBN: 84-7114-784-X.
BRADY, N.C. Y WEIL, R.R. (2008) The nature and properties of soils. Prentice Hall. 14ª edition. ISBN: 978-01-3227-938-3
SEOANEZ CALVO, M. Y COL. (1999) Contaminación del suelo: Estudios, tratamiento y gestión. Ed. Ediciones Mundi-Prensa, Madrid 1999. ISBN: 84-7114-806-4.